I claim:

- 1. A lightwave electromagnetic antenna for the purpose of sending and receiving electromagnetic energy, said electromagnetic antenna having a linear conductor electrically connected to a substrate material, said linear conductor having an electrical length sized to respond to an electromagnetic light wavelength.
- 2. The lightwave electromagnetic antenna as recited in claim 1, wherein said linear conductor is oriented generally perpendicular to said substrate material.
- 3. The lightwave electromagnetic antenna as recited in claim 1, wherein said linear conductor is comprised of a carbon nanotube.
- 4. The lightwave electromagnetic antenna as recited in claim 1, wherein said electrical length of said linear conductor is sized to correspond to infrared, visible or ultraviolet light.
- 5. The lightwave electromagnetic antenna as recited in claim 1, wherein said linear conductor is attached to said substrate material at one end of said linear conductor.
- 6. A lightwave electromagnetic device having a linear conductor attached to a junction, said linear conductor having an electrical length sized to respond to light wavelength energy, said junction having a non-linear electrical charge transfer characteristic.
- 7. The lightwave electromagnetic device as recited in claim 6, wherein said junction is comprised of a nanoparticle.
- 8. The lightwave electromagnetic device as recited in claim 6, wherein said junction is comprised of a semiconducting substrate.
 - 9. The lightwave electromagnetic device as recited in claim 6,

wherein said junction is electrically connected to a further electrical port.

10. A method of generating harmonic energy near light wavelengths comprising the steps of:

exposing a conductor to an infrared, visible or ultraviolet electromagnetic light energy having an alternating waveform,

inducing a current with said electromagnetic energy in said conductor to cause an electrical charge to cross a junction,

emitting at least a portion of said energy at a harmonic multiple of said light energy from said junction.

11. A device for rectifying an alternating waveform occurring around light wavelengths comprising;

a short conductor of less than 10,000 nanometers in length, and,

a nonlinear region with an electrical length less than a light wavelength attached to at least one end of said short conductor.

- 12. The device for rectifying an alternating waveform occurring around light wavelengths as recited in claim 11, wherein said short conductor is comprised of a carbon nanotube.
- 13. The device for rectifying an alternating waveform occurring around light wavelengths as recited in claim 11, wherein said nonlinear region is adjacent to one end of said short conductor.
- 14. A lightwave electromagnetic antenna having a linear conductor attached to a substrate material, said linear conductor having an electrical length sized to respond to an electromagnetic light wavelength.
- 15. The lightwave electromagnetic antenna as recited in claim 14, wherein said short linear conductor is in a range of 60 to 10,000 nanometers in length.

- 16. The lightwave electromagnetic antenna as recited in claim 14, wherein said linear conductor is elongated and has a high length-to-diameter ratio.
- 17. The lightwave electromagnetic antenna as recited in claim 14, wherein said substrate material is at least partly comprised of a solid semiconducting material.
- 18. The lightwave electromagnetic antenna of claim 17, wherein said semiconducting material is a foraminous semiconducting material.